



BILLING CODE: 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XC561

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Conducting Maritime Strike Operations by Eglin Air Force Base in the Gulf of Mexico

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; issuance of incidental harassment authorization.

SUMMARY: In accordance with the Marine Mammal Protection Act (MMPA) regulations, notification is hereby given that NMFS has issued an Incidental Harassment Authorization (IHA) to the U.S. Air Force (USAF), Eglin Air Force Base (Eglin AFB), to take marine mammals, by harassment, incidental to Maritime Strike Operations in the Gulf of Mexico (GOM). The USAF's activities are considered military readiness activities.

DATES: Effective August 19, 2013, through August 18, 2014.

ADDRESSES: An electronic copy of the authorization, the application containing a list of the references used in this document, and the Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) may be obtained by writing to Michael Payne, Chief, Permits, Conservation and Education Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910-3225, telephoning the contact listed below (see FOR FURTHER INFORMATION CONTACT), or visiting the internet at:

<http://www.nmfs.noaa.gov/pr/permits/incidental.htm>. Documents cited in this notice may also be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Brian D. Hopper, Office of Protected Resources, NMFS, (301) 427-8401.

#### SUPPLEMENTARY INFORMATION:

##### Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the U.S. can apply for an authorization to incidentally take small numbers of marine mammals

by harassment. Section 101(a)(5)(D) establishes a 45-day time limit for NMFS review of an application followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of marine mammals. Within 45 days of the close of the comment period, NMFS must either issue or deny the authorization.

The National Defense Authorization Act (NDAA) (Public Law 108-136) removed the “small numbers” and “specified geographical region” provisions and amended the definition of “harassment” as it applies to a “military readiness activity” to read as follows (section 3(18)(B) of the MMPA): (i) Any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild [Level A Harassment]; or (ii) Any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered [Level B Harassment].

#### Summary of Request

NMFS received an application on December 11, 2012, from Eglin AFB for the taking, by harassment, of marine mammals incidental to Maritime Strike Operations within the Eglin Gulf Test and Training Range (EGTTR). A revised application was submitted on January 22, 2013, which provided updated marine mammal information. The EGTTR is described as the airspace over the Gulf of Mexico (GOM) that is controlled by Eglin AFB. The planned test location in the EGTTR is Warning Area 151 (W-151), which is located approximately 17 miles offshore from Santa Rosa Island, specifically sub-area W-151A.

The Maritime Strike operations may potentially impact marine mammals at or near the water surface. Marine mammals could potentially be harassed, injured, or killed by exploding and non-exploding projectiles, and falling debris. However, based on analyses provided in the USAF's Environmental Assessment (EA), Eglin's IHA application, including the required mitigation, and for reasons discussed later in this document, NMFS does not anticipate that Eglin's Maritime Strike exercises will result in any serious injury or mortality to marine mammals. Eglin AFB has requested authorization to take two cetacean species by Level A and Level B harassment. The requested species include: Atlantic bottlenose dolphin (Tursiops truncatus) and Atlantic spotted dolphin (Stenella frontalis).

#### Description of the Specified Activity

This section describes the Maritime Strike missions that have the potential to affect marine mammals present within the test area. Maritime Strike operations, a "military readiness activity" as defined under 16 U.S.C. 703 note, involve detonations above the water, near the water surface, and under water within the EGTTT. These missions involve multiple types of live munitions identified in Tables 1 and 2 below. The Maritime Strike operations are described in more detail in the following paragraphs.

The Maritime Strike program was developed in response to the increasing threats at sea posed by operations conducted from small boats. The first phase of the Maritime Strike program focused on detecting and tracking boats using various sensors, simulated weapons engagements, and testing with inert munitions. The final phase, and the subject of this notice, consists of testing the effectiveness of live munitions on small boat threats. The proposed Maritime Strike activities would involve the use of multiple types of live munitions in the EGTTT against small

boat targets, at all desired surface and water depth scenarios (maximum depth of 10 feet below the surface) necessary to carry out the Tactics Development and Evaluation (TD&E) Program. Multiple munitions (bombs, missiles, and gunner rounds) and aircraft would be used to meet the objectives of the Maritime Strike program (Table 1). Because the tests focus on weapon/target interaction, particular aircraft are not specified for a given test as long as it meets the delivery parameters. The munitions would be deployed against static, towed, and remotely controlled boat targets. Static and controlled targets consist of stripped boat hulls with plywood simulated crews and systems. Damaged boats would be recovered for data collection. Test data collection and operation of remotely controlled boats would be conducted from an instrumentation barge anchored on-site, which would also provide a platform for cameras and weapon-tracking equipment. Target boats would be positioned 300 to 600 feet from the instrument barge, depending on the munition.

Table 1. Live Munitions and Aircraft

Munitions	Aircraft (not associated with specific munitions)
GBU-10 laser-guided Mk-84 bomb	F-16C fighter aircraft
GBU-24 laser-guided Mk-84 bomb	F-16C+ fighter aircraft
GBU-31 Joint Direct Attack Munition, global positioning system guided Mk-84 bomb	F-15E fighter aircraft
GBU-12 laser-guided Mk-82 bomb	A-10 fighter aircraft
GBU-38 Joint Direct Attack Munition, global positioning system guided Mk-82 bomb	B-1B bomber aircraft
GBU-54 Laser Joint Direct Attack Munition, laser-guided Mk-82 bomb	B-52H bomber aircraft
CBU-103/B bomb	MQ-1/9 unmanned aerial vehicle
AGM-65E/L/K/G2 Maverick air-to-surface missile	
AGM-114 Hellfire air-to-surface missile	
M-117 bomb	
PGU-12 high explosive incendiary 30 mm rounds	
M56/PGU-28 high explosive incendiary 20mm rounds	

Live testing will include three detonation options: (1) above the water surface; (2) at the water surface; and (3) below the water surface (two depths). The number of each type of munition, height or depth of detonation, explosive material, and net explosive weight (NEW) of each munition is provided in Table 2.

Table 2. Maritime Strike Munitions

Type of Munition	Total # of Live Munitions	# of Detonations by Height/Depth	Warhead – explosive material	Net Explosive Weight per Munition
GBU-10	1	Water Surface: all	MK-84 - Tritonal	945 lbs
GBU-24	1	Water Surface: all	MK-84 - Tritonal	945 lbs
GBU-31 (JDAM)	13	Water Surface: 4	MK-84 - Tritonal	945 lbs (MK-84)
		20 feet AGL: 3		
		5 feet underwater: 3		
		10 feet underwater: 3		
GBU-12	1	Water Surface: all	MK-82 - Tritonal	192 lbs
GBU-38 (JDAM)	13	Water Surface: 4	MK-82 – Tritonal	192 lbs (MK-82)
		20 feet AGL: 3		
		5 feet underwater: 3		
		10 feet underwater: 3		
GBU-54 (LJDAM)	1	Water Surface: all	MK-82 – Tritonal	192 lbs (MK-82)
AGM-65E/L/K/G2 (Maverick)	2 each (8 total)	Water Surface: all	WDU-24/B penetrating blast-fragmentation warhead	86 lbs
CBU-103	4	Water Surface: all	202 Blu-97/B Combined Effects Bomblets (0.63 lbs each)	127 lbs
AGM-114 (Hellfire)	4	Water Surface: all	High Explosive Anti-Tank (HEAT) tandem anti-armor metal augmented charge	20 lbs
M-117	6	20 feet AGL: 3	750 lb blast/fragmentation bomb, used the same way as MK-82 - Tritonal	386 lbs (Tritonal)
		Water Surface: 3		
PGU-12 HEI 30 mm	1,000	Water Surface: all	30 x 173 mm caliber with aluminized RDX explosive. Designed for GAU-8/A Gun System	0.1 lbs
M56/PGU-28 HEI 20 mm	1,500	Water Surface: all	20 x 120 mm caliber with aluminized Comp A-4 HEI. Designed for M61 and M197 Gun System	0.02 lbs (Comp A-4 HEI)

Maritime Strike missions are scheduled to occur over an approximate two- to three-week period in August 2013. Missions will occur on weekdays during daytime hours only, with one or two missions occurring per day. All activities will take place within the EGTTR. Activities will occur only in Warning Area W-151, and specifically in sub-area W-151A. W-151A extends approximately 60 nm offshore and has a surface area of 2,565 nm<sup>2</sup> (8,797 km<sup>2</sup>). Water depths range from about 30 to 350 m and include continental shelf and slope zones; however, most of W-151A occurs over the continental shelf, in water depths less than 250 m. Maritime Strike operations will occur in the shallower, northern inshore portion of W-151A, in water depth of about 35 m (see Figure 2-1 in Eglin's IHA application for a map of the test area).

To ensure safety, prior to conducting Maritime Strike exercises, Eglin will conduct a pre-test target area clearance procedure for people and protected species. Support vessels will be deployed around a defined safety zone to ensure that commercial and recreational boats do not accidentally enter the area. Before delivering the ordnance, mission aircraft will make a dry run over the target area to ensure that it is clear of commercial and recreational boats (at least two aircraft would participate in each test). Due to the limited duration of the flyover and potentially high speed and altitude, pilots will not be able to survey for marine species. In addition, an E-9A surveillance aircraft will survey the target area for nonparticipating vessels and other objects on the water surface. Based on the results from an acoustic impacts analysis for live ordnance detonations, a separate disturbance zone around the target will be established for the protection of marine species. The size of the zone will be based on the distance to which energy- and pressure-related impacts will extend for the various type of ordnance listed in Table 2 and will not necessarily be the same size as the human safety zone. Based on the acoustic modeling

result, the largest possible distance from the target will be 3,526 m (2.2 miles), which corresponds to the 177 dB Level B harassment threshold for 945 lb NEW munitions detonated at 10 ft underwater (Table 5). At least two of the support vessels will monitor for marine mammals around the target area. Maritime Strike missions will not proceed until the target area is determined to be clear of unauthorized personnel and protected species.

In addition to vessel-based monitoring, one to three video cameras will be positioned on an instrumentation barge anchored on-site. The camera configuration and actual number of cameras used would depend on the specific test being conducted. The cameras are typically used for situational awareness of the target area and surrounding area, and could also be used for monitoring the test site for the presence of marine species. A marine species observer will be located in the Eglin control tower, along with mission personnel, to monitor the video feed before and during test activities.

After each test, floating targets will be inspected to identify and render safe any unexploded ordnance (UXO), including fuzes or intact munitions. The Eglin Air Force Explosive Disposal Team will be on hand for each test. UXO that cannot be removed will be detonated in place, which could result in the sinking of the target vessel. Once the area has been cleared for re-entry, test personnel will retrieve target debris and marine species observers will survey the area for any evidence of adverse impacts to protected species.

#### Comments and Responses

A notice of receipt of Eglin AFB's application and NMFS' proposal to issue an IHA to the USAF, Eglin AFB, published in the Federal Register on June 4, 2013 (78 FR 33357). During the 30-day public comment period, NMFS received comments from the Marine Mammal



Commission (MMC) and a member of the public. The comment from the private citizen opposed the issuance of an authorization without any specific substantiation for why the authorization should not be issued. Following are the comments from the MMC and NMFS' responses.

Comment 1: The MMC expressed their belief that all permanent hearing loss should be considered a serious injury and recommends that NMFS propose to issue regulations under section 101(a)(5)(A) of the MMPA and a letter of authorization, rather than an incidental harassment authorization, for any proposed activities expected to cause a permanent threshold shift (PTS).

Response: PTS is considered an injury to the auditory system, but not a serious injury. NMFS PTS thresholds are based on the onset of PTS, meaning about a 30% incident of PTS (Ketten 1995; DON 1998) and a 50% likelihood of eardrum rupture (which is often recoverable (Kerr and Byrne, 1975)). An animal would either need to be exposed to the sound above this threshold for a long amount of time (not likely with explosives) or a much higher level (meaning being closer to the source) than the threshold in order to incur a significantly more serious degree of PTS. Because of the short duration of the proposed activity (few weeks) combined with the density of marine mammals, it is unlikely that a marine mammal would even randomly enter the area where more severe PTS would be a risk. However, when mitigation measures and likely avoidance of an area of high levels of training activities are considered, it becomes highly unlikely. Additionally, some degree of presbycusis is fairly common in the wild (i.e., high-frequency hearing loss), especially with older animals, and there is no data suggesting whether, or at what significantly greater degree of PTS, this reduced hearing might potentially lead to

mortality. NMFS does not believe that serious injury will result from this activity and that therefore it is not necessary to issue regulations through section 101(a)(5)(A), rather, an IHA may be issued.

Comment 2: The MMC expressed concern regarding Eglin AFB's use of two different, and seemingly contrary, methods (i.e., total net explosive weight of all ordnance in a single burst versus net explosive weight of a single bomblet as numerous individual bursts) for estimating zones of exposure. The MMC recommended that NMFS withhold issuing the IHA until (1) the USAF has modeled the various scenarios consistently for all operations that involve more than one bomb, bomblet, missile, or round and (2) has consulted with the MMC regarding resolution of this issue.

Response: The MMC may be confusing calculation methods for determining zones of exposures (the area of potential impact defined as a radius in the application) with estimating takes of each species for each threshold and criteria (total number of animals exposed to noise levels that may result in Level A or Level B harassment). These calculations are two separate processes. With the exception of the gunnery rounds and CBU-103 cluster bombs, the zones of exposure for all other munitions were based on the detonation/burst of one munition at a given depth; not the total number of munitions planned to be detonated for the duration of the test. On the other hand, Level A and Level B take estimates of each species were calculated by summing together all detonations proposed to occur for each munition at a given depth. The methodology and analytical approach for determining the exposure zones and estimating the number of marine mammal takes was fully explained in the IHA application, the Notice of Proposed IHA (78 FR 33357, June 4, 2013), as well as in the previous IHAs issued to Eglin AFB, and supporting

documents issued for this activity. Readers should refer to those documents for additional information, but a summary follows.

Zones of exposure to determine Level A and Level B Harassment impact areas were calculated as the product of the impact area of a single burst of each munition and the number of bursts planned to occur during each testing scenario. For this analysis, a “burst” must be sufficiently spaced in time or location such that it could: 1) affect a different set of marine mammals; or 2) affect the same individuals multiple times. The firing sequence for the 20-mm and 30-mm rounds consists of expending a large number of individual rounds at one target, all of which detonate within one second of each other. Due to the tight spacing in time and location, for modeling purposes, each burst of 1,000 or 1,500 rounds is treated as a single detonation. On the other hand, the CBU-103 cluster bombs are treated differently based on the dispersed pattern and timing of individual bomblet detonations. The CBU-103’s 202 bomblets are released mid-air and spread out to cover a larger target area, and may detonate over the course of a few to several seconds. Therefore the 202 bomblets are not combined as a single burst for calculating the zones of exposure for Level A and Level B Harassment.

Using this approach, Eglin AFB estimated the number of marine mammal takes using the adjusted density estimates for each species, the ZOI of each type of ordnance deployed, and the total number of live ordnance events. The results are presented in Table 8.

#### Description of Marine Mammals in the Area of the Specified Activity

There are 28 species of marine mammals documented as occurring in Federal waters of the northern GOM. However, species with likely occurrence in the test area, and the subject of Eglin’s incidental take request, are the Atlantic bottlenose dolphin (*Tursiops truncatus*) and

Atlantic spotted dolphin (Stenella frontalis). These two species are frequently sighted in the northern GOM over the continental shelf, in a water depth range that encompasses the Maritime Strike test location (Garrison et al., 2008; Navy, 2007; Davis et al., 2000). Dwarf sperm whales (Kogia sima) and pygmy sperm whales (K. breviceps) are occasionally sighted over the shelf, but are not considered regular inhabitants (Davis et al., 2000). The remaining cetacean species are primarily considered to occur at or beyond the shelf break (water depth of approximately 200 m), and are not included in the proposed take authorization. Of the 28 marine mammal species or stocks that may occur in the northern GOM, only the sperm whale is listed as endangered under the ESA and as depleted under the MMPA. Sperm whale occurrence in the area of the proposed activity is unlikely because almost all reported sightings have occurred in water depths greater than 200 m. Occurrence in the deeper portions of W-151 is possible, although based on reported sightings locations, density is expected to be low. Therefore, Eglin AFB has not requested and NMFS has not proposed the issuance of take authorizations for this species. Eglin AFB's MMPA application contains a detailed discussion on the description, status, distribution, regional distribution, diving behavior, and acoustics and hearing for the marine mammals in the action area. More detailed information on these species can be found in Wursig et al. (2000), Eglin's EA (see ADDRESSES), and in the NMFS U.S. Atlantic and GOM Stock Assessment Reports (SARs; Waring et al., 2011). This latter document is available at: <http://www.nefsc.noaa.gov/publications/tm/tm210/>. The West Indian manatee (Trichechus manatus) is managed by the U.S. Fish and Wildlife Service and is not considered further in this proposed IHA Federal Register notice.

Density estimates for bottlenose dolphin and spotted dolphin were derived from two sources. Bottlenose dolphin density estimates were derived from a habitat modeling project conducted for portions of the EGTTR, including the Maritime Strike project area (Garrison, 2008). NMFS developed habitat models using recent aerial survey line transect data collected during winter and summer. The surveys covered nearshore and continental shelf waters (to a maximum depth of 200 meters), with the majority of effort concentrated in waters from the shoreline to 20 meters depth. Marine species encounter rates during the surveys were corrected for sighting probability and the probability that animals were available on the surface to be seen. In combination with remotely sensed environmental data/habitat parameters (water depth, sea surface temperature and chlorophyll), these data were used to develop habitat models for cetaceans within the continental shelf and coastal waters of the eastern GOM. The technical approach, described as Generalized Regression and Spatial Prediction, spatially projects the species-habitat relationship based on distribution of environmental factors, resulting in predicted densities for un-sampled locations and times. The spatial density model can therefore be used to predict density in unobserved areas and at different times of year based upon the monthly composite SST and chlorophyll datasets derived from satellite data. Similarly, the spatial density model can be used to predict relative density for any sub-region within the surveyed area.

Garrison (2008) produced bottlenose dolphin density estimates at various spatial scales within the EGTTR. At the largest scale, density data were aggregated into four principal strata categories: North-Inshore, North-Offshore, South-Inshore, and South-Offshore. Densities for these strata were provided in the published survey report. Unpublished densities were also provided for smaller blocks (sub-areas) corresponding to airspace units and a number of these

sub-areas were combined to form larger zones. Densities in these smaller areas were provided to Eglin AFB in Excel<sup>®</sup> spreadsheets by the report author.

For both large areas and sub-areas, regions occurring entirely within waters deeper than 200 meters were excluded from predictions, and those straddling the 200 meter isobath were clipped to remove deep water areas. In addition, because of limited survey effort, density estimates beyond 150 meters water depth are considered invalid. The environmental conditions encountered during the survey periods (February and July/August) do not necessarily reflect the range of conditions potentially encountered throughout the year. In particular, the transition seasons of spring (April-May) and fall (October-November) have a very different range of water temperatures. Accordingly, for predictions outside of the survey period or spatial range, it is necessary to evaluate the statistical variance in predicted values when attempting to apply the model. The coefficient of variation (CV) of the predicted quantity is used to measure the validity of model predictions. According to Garrison (2008), the best predictions have CV values of approximately 0.2. When CVs approach 0.7, and particularly when they exceed 1.0, the resulting model predictions are extremely uncertain and are considered invalid.

Based upon the preceding discussion, the bottlenose dolphin density estimate used in this document is the median density corresponding to sub-area 137 (see Figure 3-1 in Eglin AFB's IHA application). The planned Maritime Strike test location lies within this sub-area. Within this block, Garrison (2008) provided densities based upon one year (2007) and five-year monthly averages for SST and chlorophyll. The 5-year average is considered preferable. Only densities with a CV rounded to 0.7 or lower (i.e., 0.64 and below) were considered. The CV for June in this particular block is 0.62. Density estimates for bottlenose dolphin are provided in Table 3.

Atlantic spotted dolphin density was derived from Fulling et al. (2003), which describes the results of mammal surveys conducted in association with fall ichthyoplankton surveys from 1998 to 2001. The surveys were conducted by NMFS personnel from the U.S.-Mexico border to southern Florida, in water depths of 20 to 200 meters. Using the software program DISTANCE<sup>®</sup>, density estimates were generated for East and West regions, with Mobile Bay as the dividing point. The East region is used in this document. Densities were provided for Atlantic spotted dolphins and unidentified T. truncatus/S. frontalis (among other species). The unidentified T. truncatus/S. frontalis category is treated as a separate species group with a unique density. Density estimates from Fulling et al. (2003) were not adjusted for sighting probability (perception bias) or surface availability (availability bias) [ $g(0) = 1$ ] in the original survey report, likely resulting in underestimation of true density. Perception bias refers to the failure of observers to detect animals, although they are present in the survey area and available to be seen. Availability bias refers to animals that are in the survey area, but are not able to be seen because they are submerged when observers are present. Perception bias and availability bias result in the underestimation of abundance and density numbers (negative bias).

Fulling et al. (2003) did not collect data to correct density for perception and availability bias. However, in order to address this negative bias, Eglin AFB has adjusted density estimates based on information provided in available literature. There are no published  $g(0)$  correction factors for Atlantic spotted dolphins. However, Barlow (2006) estimated  $g(0)$  for numerous marine mammal species near the Hawaiian Islands, including offshore pantropical spotted dolphins (Stenella attenuata). Separate estimates for this species were provided for group sizes of 1 to 20 animals [ $g(0) = 0.76$ ], and greater than 20 animals [ $g(0) = 1.00$ ]. Although Fulling et

al. (2003) sighted some spotted dolphin groups of more than 20 individuals, the 0.76 value is used as a more conservative approach. Barlow (2006) provides the following equation for calculating density:

$$\frac{(n)(S)(f_0)}{(2L)(g_0)}$$

Density (# animals/km<sup>2</sup>) =

Where n = number of animal group sightings on effort

S = mean group size

f(0) = sighting probability density at zero perpendicular distance (influenced by species detectability and sighting cues such as body size, blows, and number of animals in a group)

L = transect length completed (km)

g(0) = probability of seeing a group directly on a trackline (influenced by perception bias and availability bias)

Because (n), (S), and (f<sub>0</sub>) cannot be directly incorporated as independent values due to lack of the original information, we substitute the variable X<sub>species</sub> which incorporates all three values, such that X<sub>species</sub> = (n)(S)( f<sub>0</sub>) for a given species. This changes the density equation to:

$$D = \frac{X_{\text{species}}}{(2L)(g_0)}$$

Using the minimum density estimates provided in Fulling et al. (2003) for Atlantic spotted dolphins and solving for X<sub>SpottedDolphin</sub>:

$$0.201 = \frac{X_{\text{Spotted Dolphin}}}{(2)(816)(1.0)}$$



$$X_{\text{SpottedDolphin}} = 328.032.$$

Placing this value of  $X_{\text{SpottedDolphin}}$  and the revised  $g(0)$  estimate (0.76) in the original equation results in the following adjusted density estimate for Atlantic spotted dolphin:

$$D_{\text{Adjusted}} = \frac{328.032}{(2)(816)(0.76)}$$

$$D_{\text{Adjusted}} = 0.265$$

Using the same method, adjusted density for the unidentified T. truncatus/S. frontalis species group is 0.009 animals/km<sup>2</sup>. There are no variances attached to either of these recalculated density values, so overall confidence in these values is unknown.

Table 3. Marine Mammal Density Estimates

Species	Density (animals/km <sup>2</sup> )
Bottlenose dolphin <sup>1</sup>	0.455
Atlantic spotted dolphin <sup>2</sup>	0.265
Unidentified bottlenose dolphin/Atlantic spotted dolphin <sup>2</sup>	0.009

<sup>1</sup>Source: Garrison, 2008; adjusted for observer and availability bias by the author

<sup>2</sup>Source: Fulling et al., 2003; adjusted for negative bias based on information provided by Barlow (2003; 2006)

## Potential Effects of the Specified Activity on Marine Mammals

Potential impacts from the detonation of explosives include non-lethal injury (Level A harassment) and disturbance (Level B harassment). Takes in the form of mortality are neither anticipated nor requested. The number of marine mammals potentially impacted by Maritime Strike operations is based on impulsive noise and pressure waves generated by ordinance detonation at or near the water surface. Exposure to energy or pressure resulting from these detonations could result in injury or harassment of marine mammal species. The number of

Maritime Strike missions generally corresponds to the number of live ordnance expenditures shown in Table 2. However, the number of bursts modeled for the CBU-103 cluster bomb is 202, which is the number of individual bomblets per bomb. Also, the 20 mm and 30 mm gunnery rounds were modeled as one burst each.

Criteria and thresholds for estimating the exposures from a single explosive activity on marine mammals were established for the Seawolf Submarine Shock Test Final Environmental Impact Statement (FEIS) (“SEAWOLF”) and subsequently used in the USS WINSTON S. CHURCHILL (DDG 81) Ship Shock FEIS (“CHURCHILL”) (DoN, 1998 and 2001). We adopted these criteria and thresholds in a final rule on the unintentional taking of marine animals occurring incidental to the shock testing which involved large explosives (65 FR 77546; December 12, 2000). Because no large explosives (greater than 1000 lbs NEW) would be used by Eglin AFB during the specified activities, a revised acoustic criterion for small underwater explosions (i.e., 23 pounds per square inch [psi] instead of previous acoustic criteria of 12 psi for peak pressure over all exposures) has been established to predict onset of TTS.

#### Thresholds and Criteria for Injurious Physiological Impacts

##### Single Explosion

For injury, NMFS uses dual criteria, eardrum rupture (i.e. tympanic-membrane injury) and onset of slight lung injury, to indicate the onset of injury. The threshold for tympanic-membrane (TM) rupture corresponds to a 50 percent rate of rupture (i.e., 50 percent of animals exposed to the level are expected to suffer TM rupture). This value is stated in terms of an Energy Flux Density Level (EL) value of 1.17 inch pounds per square inch (in-lb/in<sup>2</sup>), approximately 205 dB re 1 microPa<sup>2</sup>- sec.

The threshold for onset of slight lung injury is calculated for a small animal (a dolphin calf weighing 26.9 lbs), and is given in terms of the “Goertner modified positive impulse,” indexed to 13 psi-msec (DoN, 2001). This threshold is conservative since the positive impulse needed to cause injury is proportional to animal mass, and therefore, larger animals require a higher impulse to cause the onset of injury. This analysis assumed the marine species populations were 100 percent small animals. The criterion with the largest potential impact range (most conservative), either TM rupture (energy threshold) or onset of slight lung injury (peak pressure), will be used in the analysis to determine Level A exposures for single explosive events.

For mortality and serious injury, we use the criterion corresponding to the onset of extensive lung injury. This is conservative in that it corresponds to a 1 percent chance of mortal injury, and yet any animal experiencing onset severe lung injury is counted as a lethal exposure. For small animals, the threshold is given in terms of the Goertner modified positive impulse, indexed to 30.5 psi-msec. Since the Goertner approach depends on propagation, source/animal depths, and animal mass in a complex way, the actual impulse value corresponding to the 30.5 psi-msec index is a complicated calculation. To be conservative, the analysis used the mass of a calf dolphin (at 26.9 lbs) for 100 percent of the populations.

#### Multiple Explosions

For multiple explosions, the CHURCHILL approach had to be extended to cover multiple sound events at the same training site. For multiple exposures, accumulated energy over the entire training time is the natural extension for energy thresholds since energy accumulates with each subsequent shot (detonation); this is consistent with the treatment of multiple arrivals in

CHURCHILL. For positive impulse, it is consistent with the CHURCHILL final rule to use the maximum value over all impulses received.

### Thresholds and Criteria for Non-Injurious Physiological Effects

To determine the onset of TTS (non-injurious harassment) — a slight, recoverable loss of hearing sensitivity, there are dual criteria: an energy threshold and a peak pressure threshold. The criterion with the largest potential impact range (most conservative), either the energy or peak pressure threshold, will be used in the analysis to determine Level B TTS exposures. We refer the reader to the following sections for descriptions of the thresholds for each criterion.

#### Single Explosion –TTS-Energy Threshold

The TTS energy threshold for explosives is derived from the Space and Naval Warfare Systems Center (SSC) pure-tone tests for TTS (Schlundt *et al.*, 2000; Finneran and Schlundt, 2004). The pure-tone threshold (192 dB as the lowest value) is modified for explosives by (a) interpreting it as an energy metric, (b) reducing it by 10 dB to account for the time constant of the mammal ear, and (c) measuring the energy in 1/3-octave bands, the natural filter band of the ear. The resulting threshold is 182 dB re 1 microPa<sup>2</sup>-sec in any 1/3-octave band.

#### Single Explosion –TTS-Peak Pressure Threshold

The second threshold applies to all species and is stated in terms of peak pressure at 23 psi (about 225 dB re 1 μPa). This criterion was adopted for Precision Strike Weapons (PSW) Testing and Training by Eglin Air Force Base in the Gulf of Mexico (NMFS, 2005). It is important to note that for small shots near the surface (such as in this analysis), the 23-psi peak pressure threshold generally will produce longer impact ranges than the 182-dB energy metric. Furthermore, it is not unusual for the TTS impact range for the 23-psi pressure metric to actually

exceed the without-TTS (behavioral change without onset of TTS) impact range for the 177-dB energy metric.

### Thresholds and Criteria for Behavioral Effects

#### Single Explosion

For a single explosion, to be consistent with CHURCHILL, TTS is the criterion for Level B harassment. In other words, because behavioral disturbance for a single explosion is likely to be limited to a short-lived startle reaction, use of the TTS criterion is considered sufficient protection and therefore behavioral effects (Level B behavioral harassment without onset of TTS) are not expected for single explosions.

#### Multiple Explosions—Without TTS

For multiple explosions, the CHURCHILL approach had to be extended to cover multiple sound events at the same training site. For multiple exposures, accumulated energy over the entire uninterrupted firing time is the natural extension for energy thresholds since energy accumulates with each subsequent shot (detonation); this is consistent with the treatment of multiple arrivals in CHURCHILL. Because multiple explosions could occur within a discrete time period, a new acoustic criterion-behavioral disturbance without TTS is used to account for behavioral effects significant enough to be judged as harassment, but occurring at lower noise levels than those that may cause TTS.

The threshold is based on test results published in Schlundt et al. (2000), with derivation following the approach of the CHURCHILL FEIS for the energy-based TTS threshold. The original Schlundt et al. (2000) data and the report of Finneran and Schlundt (2004) are the basis for thresholds for behavioral disturbance without TTS. During this study, instances of altered

behavior sometimes began at lower exposures than those causing TTS; however, there were many instances when subjects exhibited no altered behavior at levels above the onset-TTS levels. Regardless of reactions at higher or lower levels, all instances of altered behavior were included in the statistical summary. The behavioral disturbance without TTS threshold for tones is derived from the SSC tests, and is found to be 5 dB below the threshold for TTS, or 177 dB re 1 microPa<sup>2</sup>-sec maximum energy flux density level in any 1/3-octave band at frequencies above 100 Hz for cetaceans.

#### Summary of Thresholds and Criteria for Impulsive Sounds

The effects, criteria, and thresholds used in the assessment for impulsive sounds are summarized in Table 4. The criteria for behavioral effects without physiological effects used in this analysis are based on use of multiple explosives from live, explosive firing during Maritime Strike exercises.

Table 4. Current NMFS acoustic criteria when addressing harassment from explosives

Effect	Criteria	Metric	Threshold	Effect
Mortality	Onset of Extensive Lung Injury	Goertner modified positive impulse	indexed to 30.5 psi-msec (assumes 100 percent small animal at 26.9 lbs)	Mortality
Injurious Physiological	50percent Tympanic Membrane Rupture	Energy flux density	1.17 in-lb/in <sup>2</sup> (about 205 dB re 1 microPa <sup>2</sup> -sec)	Level A
Injurious Physiological	Onset Slight Lung Injury	Goertner modified positive impulse	indexed to 13 psi-msec (assumes 100 percent small animal at 26.9 lbs)	Level A
Non-injurious Physiological	TTS	Greatest energy flux density level in any 1/3-octave band (> 100 Hz for toothed whales and > 10 Hz for baleen whales) - for total energy over all exposures	182 dB re 1 microPa <sup>2</sup> -sec	Level B
Non-injurious Physiological	TTS	Peak pressure over all exposures	23 psi	Level B
Non-injurious Behavioral	Multiple Explosions Without TTS	Greatest energy flux density level in any 1/3-octave (> 100 Hz for toothed whales and > 10 Hz for baleen whales) - for total energy over all exposures (multiple explosions only)	177 dB re 1 microPa <sup>2</sup> -sec	Level B

#### Anticipated Effects on Habitat

The primary source of marine mammal habitat impact is noise resulting from live Maritime Strike missions. However, the noise does not constitute a long-term physical alteration of the water column or bottom topography. In addition, the activity is not expected to affect prey availability, is of limited duration, and is intermittent in time. Surface vessels associated with the missions are present in limited duration and are intermittent as well. Therefore, it is not anticipated that marine mammal utilization of the waters in the project area will be affected, either temporarily or permanently, as a result of mission activities.

Other sources that could potentially impact marine mammal habitat were considered and include the introduction of fuel, debris, ordnance, and chemical materials into the water column. The potential effects of each were analyzed in the Environmental Assessment and determined to be insignificant. The analyses are summarized in the following paragraphs (for a complete discussion of potential effects, please refer to section 3.3 in the EA).

Metals typically used to construct bombs, missiles, and gunnery rounds include copper, aluminum, steel, and lead, among others. Aluminum is also present in some explosive materials. These materials would settle to the seafloor after munitions detonate. Metal ions would slowly leach into the substrate and the water column, causing elevated concentrations in a small area around the munitions fragments. Some of the metals, such as aluminum, occur naturally in the ocean at varying concentrations and would not necessarily impact the substrate or water column. Other metals, such as lead, could cause toxicity in microbial communities in the substrate. However, such effects would be localized to a very small distance around munitions fragments and would not significantly affect the overall habitat quality of sediments in the northeastern GOM. In addition, metal fragments would corrode, degrade, and become encrusted over time.

Chemical materials include explosive byproducts and also fuel, oil, and other fluids associated with remotely controlled target boats. Explosive byproducts would be introduced into the water column through detonation of live munitions. Explosive materials would include 2,4,6-trinitrotoluene (TNT) and RDX, among others. Various byproducts are produced during and immediately after detonation of TNT and RDX. During the very brief time that a detonation is in progress, intermediate products may include carbon ions, nitrogen ions, oxygen ions, water, hydrogen cyanide, carbon monoxide, nitrogen gas, nitrous oxide, cyanic acid, and carbon dioxide



(Becker, 1995). However, reactions quickly occur between the intermediates, and the final products consist mainly of water, carbon monoxide, carbon dioxide, and nitrogen gas, although small amounts of other compounds are typically produced as well.

Chemicals introduced into the water column would be quickly dispersed by waves, currents, and tidal action, and eventually become uniformly distributed. A portion of the carbon compounds such as carbon monoxide and carbon dioxide would likely become integrated into the carbonate system (alkalinity and pH buffering capacity of seawater). Some of the nitrogen and carbon compounds, including petroleum products, would be metabolized or assimilated by phytoplankton and bacteria. Most of the gas products that do not react with the water or become assimilated by organisms would be released into the atmosphere. Due to dilution, mixing, and transformation, none of these chemicals are expected to have significant impacts on the marine environment.

Explosive material that is not consumed in a detonation could sink to the substrate and bind to sediments. However, the quantity of such materials is expected to be inconsequential. Research has shown that if munitions function properly, nearly full combustion of the explosive materials will occur, and only extremely small amounts of raw material will remain. In addition, any remaining materials would be naturally degraded. TNT decomposes when exposed to sunlight (ultraviolet radiation), and is also degraded by microbial activity (Becker, 1995). Several types of microorganisms have been shown to metabolize TNT. Similarly, RDX decomposes by hydrolysis, ultraviolet radiation exposure, and biodegradation.

Based on this information, the proposed Maritime Strike activities would not have any impact on the food or feeding success of marine mammals in the northern GOM. Additionally,

no loss or modification of the habitat used by cetaceans in the GOM is expected. Marine mammals are anticipated to temporarily vacate the area of live fire events. However, these events usually do not last more than 90 to 120 min at a time, and animals are anticipated to return to the activity area during periods of non-activity. Thus, the proposed activity is not expected to have any habitat-related effects that could cause significant or long-term consequences for individual marine mammals or on the food sources that they utilize.

### Mitigation

In order to issue an incidental take authorization (ITA) under sections 101(a)(5)(A) and (D) of the MMPA, NMFS must, where applicable, set forth the permissible methods of taking pursuant to such activity and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses (where relevant). The NDAA of 2004 amended the MMPA as it relates to military readiness activities and the ITA process such that "least practicable impact" shall include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the "military readiness activity". The Maritime Strike activities described in Eglin AFB's application are considered military readiness activities.

### Visual Mitigation

Areas to be used for Maritime Strike operations would be visually monitored for marine mammal presence from several platforms before, during, and after the commencement of the mission. Eglin AFB would provide experienced protected species survey personnel, vessels, and equipment as required for vessel-based surveys. The primary observers would be marine

scientists with over 1,000 hours of marine mammal surveying experience collectively.

Additionally, all range clearance personnel involved with the missions would receive NMFS-approved training developed by the Eglin Natural Resources Section. The designated protected species survey vessels would be two 25-ft (7.6 m) Parker 2520 boats with a fully enclosed pilothouse and tower. These vessels provide large viewing areas and observers would be stationed approximately 16-ft (4.9 m) above the water surface. Each vessel will have two observers and each observer will be equipped with binoculars. Observers will rotate on a regular basis to prevent eye fatigue as needed. Additional protected species survey vessels can be made available if required.

If the presence of one or more marine mammals is detected, the target area will be avoided. In addition, monitoring will continue during the mission. If marine mammals are detected at any time, the mission will halt immediately and relocate as necessary or be suspended until the marine mammal has left the area. The visual mitigation procedures for Maritime Strike operations are outlined below.

Pre-mission: The purposes of pre-mission monitoring are to: (1) evaluate the test site for environmental suitability of the mission; and (2) verify that the Zone of Influence (ZOI) is free of visually detectable marine mammals, as well as potential indicators of these species. The area of the ZOI surveyed would be based on the distance to the largest Level B harassment threshold for the specific ordnance involved in a given test. For example, the largest ZOI would be 3,526 m (2.2 mi), which corresponds to the distance to the Level B threshold (177 dB) for 945 lb munitions detonated at 3 m (10 ft) underwater. The smallest ZOI would be 37 m (0.02 mi), which is the distance to the Level B threshold (23 psi) for 20 mm gunnery rounds. Table 5

provides the ZOI ranges for all the ordnance types and detonation depths proposed for Maritime Strike operations. On the morning of the Maritime Strike mission, the test director and safety officer would confirm that there are no issues that would preclude mission execution and that weather is adequate to support mitigation measures.

(A) Two Hours Prior to Mission

Mission-related surface vessels would be on site at least two hours prior to the mission. Observers on board at least one vessel would assess the overall suitability of the test site based on environmental conditions (e.g., sea state) and presence/absence of marine mammals or marine mammal indicators. This information would be related to the safety officer.

(B) One and One-half Hours Prior to Mission

Vessel-based surveys and video camera surveillance would begin one and one-half hours prior to live weapon deployment. Surface vessel observers would survey the applicable ZOI and relay all marine species and indicator sightings, including the time of sighting and direction of travel, if known, to the safety officer. Surveys would continue for approximately one hour. During this time, mission personnel in the test area would also observe for marine species as feasible. If marine mammals or indicators are observed within the applicable ZOI, the test range would be declared “fouled,” which would signify to mission personnel that conditions are such that a live ordnance drop cannot occur (e.g., protected species or civilian vessels are in the test area). If no marine mammals or indicators are observed, the range will be declared “green.”

(C) One-half Hour Prior to Mission

At approximately 30 minutes prior to live weapon deployment, marine species observers would be instructed to leave the test site and remain outside the safety zone, which on average

would be 9.5 miles from the detonation point, (the actual size would be determined by weapon NEW and method of delivery) during conduct of the mission. Once the survey vessels have arrived at the perimeter of the safety zone (approximately 30 minutes after being instructed to leave, depending on actual travel time) the mission would be allowed to proceed. Monitoring for protected species would continue from the periphery of the safety zone while the mission is in progress. The other safety boat crews would also be instructed to observe for marine mammals. Due to the distance from the target site, these observations would be considered supplemental and would not be relied upon as the primary monitoring method. After survey vessels leave the area, marine species monitoring would continue from the tower through the video feed received from the high definition cameras on the instrument barge.

#### (D) Execution of Mission

Immediately prior to live weapons drop, the test director and safety officer will communicate to confirm the results of marine mammal surveys and the appropriateness of proceeding with the mission. The safety officer will have final authority to proceed with, postpone, move, or cancel the mission. The mission will be postponed or moved if:

(1) Any marine mammal is visually detected within the applicable ZOI. Postponement will continue until the animal(s) that caused the postponement is confirmed to be outside of the applicable ZOI due to the animal swimming out of the range.

(2) Large schools of fish or large flocks of birds feeding at the surface are observed within the applicable ZOI. Postponement will continue until these potential indicators are confirmed to be outside the applicable ZOI.

In the event of a postponement, pre-mission monitoring will continue as long as weather and daylight hours allow.

**Post-mission Monitoring:** Post mission monitoring will be designed to determine the effectiveness of pre-mission visual mitigation by reporting sightings of any dead or injured marine mammals. If post-mission surveys determine that an injury or lethal take of a marine mammal has occurred, the next Maritime Strike mission will be suspended until the test procedure and the monitoring methods have been reviewed with NMFS and appropriate changes made. Post-mission monitoring surveys will be conducted by the same observers that conducted pre-mission surveys, and will commence as soon as EOD personnel declare the test area safe. Vessels will move into the applicable ZOI from outside the safety zone and monitor for at least 30 minutes, concentrating on the area down-current of the test site. The monitoring team will document any marine mammals that were killed or injured as a result of the test and immediately contact the local marine mammal stranding network and NMFS to coordinate recovery and examination of any dead animals. The species, number, location, and behavior of any animals observed will be documented and reported to the Eglin Natural Resources Section.

Multiple offshore Air Force missions have been successfully executed in the general vicinity of the proposed Maritime Strike test location (W-151 of the EGTTR). These missions have involved both inert (no explosives) and live weapons testing, and include the following:

- 2009 Stand-off Precision Guided Munitions (SOPGM) live missile tests
- 2012 Maritime Strike inert drops
- 2013 Longbow live missile test (in-air detonation)

- 2013 Combat Hammer Maritime WESP missions (inert drops in the Gulf and strafing in the Choctawhatchee Bay)

During these missions, vessel-based observers surveyed for protected marine species (marine mammals and sea turtles) and species indicators. They also provided support to enforce human safety exclusion zones.

All live and inert missions were conducted in a variety of sea states and weather conditions that encompass the environmental conditions likely to be encountered during Maritime Strike activities. While no marine mammals were sighted within the various take threshold zones (mortality, Level A and B harassment zones) during any of the live tests (i.e., SOPGM and Longbow missile), survey personnel judged that they were able to adequately observe the sea surface and there was reasonable likelihood that marine mammals would have been detected if present. There have been no documented marine mammal takes throughout Eglin's history of activities in the Gulf of Mexico. Therefore, based on these factors, Eglin AFB and NMFS expect that trained protected species observers would be able to adequately survey and clear mortality zones (maximum of 457 m) and effectively communicate any marine mammal sightings to test directors. Further, we expect that test directors would be able to act quickly to delay live weapon drops should protected species be observed.

NMFS has carefully evaluated the applicant's proposed mitigation measures and considered a range of other measures in the context of ensuring that NMFS prescribes the means of effecting the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another:

- The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;
- The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- The practicability of the measure for applicant implementation, including consideration of personnel safety, practicability of implementation, and impact on the effectiveness of the military-readiness activity.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, the required mitigation measures provide the means of effecting the least practicable impact on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, while also considering personnel safety, practicability of implementation, and impact on the effectiveness of the military-readiness activity.

#### Monitoring and Reporting

In order to issue an ITA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must, where applicable, set forth "requirements pertaining to the monitoring and reporting of such taking". The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for ITAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area.

NMFS has included the following measures in the Maritime Strike IHA. They are:



(1) Eglin will track their use of the EGTR for test firing missions and protected species observations, through the use of mission reporting forms.

(2) A summary annual report of marine mammal observations and Maritime Strike activities will be submitted to the NMFS Southeast Regional Office (SERO) and the Office of Protected Resources either at the time of a request for renewal of an IHA or 90 days after expiration of the current IHA if a new IHA is not requested. This annual report must include the following information: (i) Date and time of each Maritime Strike exercise; (ii) a complete description of the pre-exercise and post-exercise activities related to mitigating and monitoring the effects of Maritime Strike exercises on marine mammal populations; and (iii) results of the Maritime Strike exercise monitoring, including numbers by species/stock of any marine mammals noted injured or killed as a result of the missions and number of marine mammals (by species if possible) that may have been harassed due to presence within the activity zone.

(3) If any dead or injured marine mammals are observed or detected prior to testing, or injured or killed during live fire, a report must be made to NMFS by the following business day.

(4) Any unauthorized takes of marine mammals (i.e., injury or mortality) must be immediately reported to NMFS and to the respective stranding network representative.

#### Estimated Take by Incidental Harassment

As it applies to a “military readiness activity”, the definition of harassment is (Section 3(18)(B) of the MMPA): (i) Any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild [Level A Harassment]; or (ii) Any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing,

nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered [Level B Harassment].

Takes by Level A and B harassment are anticipated as a result of the Maritime Strike mission activities. The exercises are expected to only affect animals at or very near the surface of the water. Cetaceans in the vicinity of the exercises may incur temporary changes in behavior, and/or temporary changes in their hearing thresholds. Based on the proposed mitigation and monitoring measures described earlier in this document, no serious injury or mortality of marine mammals is anticipated as a result of Maritime Strike activities, and no takes by serious injury or mortality are proposed to be authorized.

Estimating the impacts to marine mammals from underwater detonations is difficult due to complexities of the physics of explosive sound under water and the limited understanding with respect to hearing in marine mammals. Assessments of impacts from Maritime Strike exercises use, and improve upon, the criteria and thresholds for marine mammal impacts that were developed for the shock trials of the USS SEAWOLF and the USS WINSTON S. CHURCHILL (DDG-81) (Navy, 1998; 2001). The criteria and thresholds used in those actions were adopted by NMFS for use in calculating incidental takes from explosives. Criteria for assessing impacts from Eglin AFB's Maritime Strike exercises include: (1) mortality, as determined by exposure to a certain level of positive impulse pressure (expressed as pounds per square inch per millisecond or psi-msec); (2) injury, both hearing-related and non-hearing related; and (3) harassment, as determined by a temporary loss of some hearing ability and behavioral reactions. Due to the mitigation measures proposed by NMFS for implementation, mortality resulting from the

resulting sounds generated into the water column from detonations was determined to be highly unlikely and was not considered further by Eglin AFB or NMFS.

Permanent hearing loss is considered an injury and is termed permanent threshold shift (PTS). NMFS, therefore, categorizes PTS as Level A harassment. Temporary loss of hearing ability is termed TTS, meaning a temporary reduction of hearing sensitivity which abates following noise exposure. TTS is considered non-injurious and is categorized as Level B harassment. NMFS recognizes dual criteria for TTS, one based on peak pressure and one based on the greatest 1/3 octave sound exposure level (SEL) or energy flux density level (EFDL), with the more conservative (i.e., larger) of the two criteria being selected for impacts analysis (note: SEL and EFDL are used interchangeably, but with increasing scientific preference for SEL). The peak pressure metric used to predict TTS is 23 pounds per square inch (psi).

Documented behavioral reactions occur at noise levels below those considered to cause TTS in marine mammals (Finneran et al., 2002; Schlundt et al., 2000; Finneran and Schlundt, 2004). In controlled experimental situations, behavioral effects are typically defined as alterations of trained behaviors. Behavioral effects in wild animals are more difficult to define but may include decreased ability to feed, communicate, migrate, or reproduce. Abandonment of an area due to repeated noise exposure is also considered a behavioral effect. Analyses in other sections of this document refer to such behavioral effects as “sub-TTS Level B harassment.” Schlundt et al. (2000) exposed bottlenose dolphins and beluga whales to various pure-tone sound frequencies and intensities in order to measure underwater hearing thresholds. Masking is considered to have occurred because of the ambient noise environment in which the experiments took place. Sound levels were progressively increased until behavioral alterations were noted (at

which point the onset of TTS was presumed). It was found that decreasing the sound intensity by 4 to 6 dB greatly decreased the occurrence of anomalous behaviors. The lowest sound pressure levels, over all frequencies, at which altered behaviors were observed, ranged from 178 to 193 dB re 1  $\mu$ Pa for the bottlenose dolphins and from 180 to 196 dB re 1  $\mu$ Pa for the beluga whales. Thus, it is reasonable to consider that sub-TTS (behavioral) effects occur at approximately 6 dB below the TTS-inducing sound level, or at approximately 177 dB in the greatest 1/3 octave band EFDL/SEL.

Table 4 (earlier in this document) summarizes the relevant thresholds for levels of noise that may result in Level A harassment (injury) or Level B harassment via TTS or behavioral disturbance to marine mammals. Mortality and injury thresholds are designed to be conservative by considering the impacts that would occur to the most sensitive life stage (e.g., a dolphin calf).

The following three factors were used to estimate the potential noise effects on marine mammals from Maritime Strike operations: (1) the zone of influence, which is the distance from the explosion to which a particular energy or pressure threshold extends; (2) the density of animals potentially occurring within the zone of influence; and (3) the number of events.

The zone of influence is defined as the area or volume of ocean in which marine mammals could potentially be exposed to various noise thresholds associated with exploding ordnance. Table 5 provides the estimated ZOI radii for the Maritime Strike ordnance. At this time, there are no empirical data or information that would allow NMFS to establish a peak pressure criterion for sub-TTS behavioral disruption.

Table 5. Estimated Range for a Zone of Impact (ZOI) Distance for the Maritime Strike Ordnance (in meters).

Munition	Height / Depth of Detonation	Mortality	Level A Harassment		Level B Harassment		
		30.5 psi-msec	205 dB EFD*	13 psi-msec	182 dB EFD*	23 psi	177 dB EFD*
GBU-10	Water Surface	202	275	362	1023	1280	1361
GBU-24	Water Surface	202	275	362	1023	1280	1361
GBU-31 (JDAM)	Water Surface	202	275	362	1023	1280	1361
	20 feet AGL	0	0	0	0	0	0
	5 feet underwater	385	468	700	2084	1281	2775
	10 feet underwater	457	591	836	2428	1280	3526
GBU-12	Water Surface	114	161	243	744	752	1020
GBU-38 (JDAM)	Water Surface	114	161	243	744	752	1020
	20 feet AGL	0	0	0	0	0	0
	5 feet underwater	239	280	445	1411	752	2070
	10 feet underwater	279	345	532	1545	752	2336
GBU-54 (LJDAM)	Water Surface	114	161	243	744	752	1020
AGM-65E/L/K/G2 (Maverick)	Water Surface	84	124	187	618	575	846
CBU-103	Water Surface	9	231	21	947	111	1335
AGM-114 (Hellfire)	Water Surface	46	70	105	425	353	618
M-117	20 feet AGL	0	0	0	0	0	0
	Water Surface	147	203	293	847	950	1125
PGU-13 HEI 30 mm	Water Surface	0	6	7	31	60	55
M56/PGU-28 HEI 20 mm	Water Surface	0	0	0	16	37	27

\* In greatest 1/3-octave band above 10 Hz or 100 Hz

Density estimates for marine mammals occurring in the EGTTT are provided in Table 3. As discussed above, densities were derived from the results of published documents authored by NMFS personnel. Density is nearly always reported for an area (e.g., animals per square kilometer). Analyses of survey results may include correction factors for negative bias, such as the Garrison (2008) report for bottlenose dolphins. Even though Fulling *et al.* (2003) did not provide a correction for Atlantic spotted dolphins or unidentified bottlenose/spotted dolphins, Eglin AFB adjusted those densities based on information provided in other published literature (Barlow 2003; 2006). Although the study area appears to represent only the surface of the water (two-dimensional), density actually implicitly includes animals anywhere within the water column under that surface area. Density estimates usually assume that animals are uniformly distributed within the prescribed area, even though this is likely rarely true. Marine mammals

are often clumped in areas of greater importance, for example, in areas of high productivity, lower predation, safe calving, etc. Density can occasionally be calculated for smaller areas, but usually there are insufficient data to calculate density for such areas. Therefore, assuming an even distribution within the prescribed area is the typical approach.

In addition, assuming that marine mammals are distributed evenly within the water column does not accurately reflect behavior. Databases of behavioral and physiological parameters obtained through tagging and other technologies have demonstrated that marine animals use the water column in various ways. Some species conduct regular deep dives while others engage in much shallower dives, regardless of bottom depth. Assuming that all species are evenly distributed from surface to bottom is almost never appropriate and can present a distorted view of marine mammal distribution in any region. Therefore, a depth distribution adjustment is applied to marine mammal densities in this document (Table 6). By combining marine mammal density with depth distribution information, a three-dimensional density estimate is possible. These estimates allow more accurate modeling of potential marine mammal exposures from specific noise sources.

Table 6. Depth Distribution of Marine Mammals in the Maritime Strike Test Area

Species	Depth Distribution	Reference
Bottlenose dolphin	Daytime: 96% at <50 m, 4% at >50 m; Nighttime: 51% at <50 m, 8% at 50-100 m, 19% at 101-250 m, 13% at 251-450 m, and 9% at >450 m.	Klatsky <u>et al.</u> (2007)
Atlantic spotted dolphin	76% at <10 m, 20% at 10-20 m, and 4% at 21-60 m.	Davis <u>et al.</u> (1996)

As mentioned previously, the number of Maritime Strike activities generally corresponds to the number of live ordnance expenditures, as shown in Table 2. However, the number of bursts modeled for the CBU-103 cluster bomb is 202, which is the number of individual

bomblets per bomb. Also, the 20 mm and 30 mm gunnery rounds were modeled as one burst each.

Table 7 indicates the modeled potential for lethality, injury, and non-injurious harassment (including behavioral harassment) to marine mammals in the absence of mitigation measures. The numbers represent total impacts for all detonations combined. Mortality was calculated as approximately one-half an animal for bottlenose dolphins and about 0.1 animals for spotted dolphins. It is expected that, with implementation of the management practices described below, potential impacts would be mitigated to the point that there would be no mortality takes. Based on the low mortality exposure estimates calculated by the acoustic model combined with the implementation of mitigation measures, zero marine mammals are expected to be affected by pressure levels associated with mortality. Therefore, Eglin AFB has requested an IHA, as opposed to an LOA.

Table 7. Modeled Number of Marine Mammals Potentially Affected by Maritime Strike Missions

Species	Mortality	Level A Harassment	Level B Harassment (TTS)	Level B Harassment (Behavioral)
Bottlenose dolphin	0.524	2.008	30.187	61.069
Atlantic spotted dolphin	0.145	1.050	16.565	31.345
Unidentified bottlenose dolphin/Atlantic spotted dolphin	0.010	0.040	0.597	1.208
TOTAL	0.679	3.098	47.349	93.622

Table 8 provides Eglin AFB's the annual number of marine mammals, by species, authorized for taking by Level A harassment and Level B harassment, incidental to Maritime Strike operations. It should be noted that these takes are authorized without consideration of the

effectiveness of Eglin AFB's proposed mitigation measures. As indicated in Table 8, Eglin AFB and NMFS estimate that approximately three marine mammals could potentially be exposed to injurious Level A harassment noise levels (205 dB re 1  $\mu\text{Pa}^2$ -s or higher).

Table 8. Number of Marine Mammals Takes

Species	Level A Harassment	Level B Harassment (TTS)	Level B Harassment (Behavioral)
Bottlenose dolphin	2	30	61
Atlantic spotted dolphin	1	16	32
Unidentified bottlenose dolphin/Atlantic spotted dolphin	0	1	1
TOTAL	3	47	94

Approximately 47 marine mammals may be exposed annually to non-injurious (TTS) Level B harassment associated with the 182 dB re 1  $\mu\text{Pa}^2$ -s threshold. TTS results from fatigue or damage to hair cells or supporting structures and may cause disruption in the processing of acoustic cues; however, hearing sensitivity is recovered within a relatively short time. Based on Eglin AFB and NMFS' estimates, up to 94 marine mammals may experience a behavioral response to these exercises associated with the 177 dB re 1  $\mu\text{Pa}^2$ -s threshold (see Table 8). NMFS has determined that this number will be significantly lower due to the expected effectiveness of the mitigation measures included in the IHA.

#### Negligible Impact and Determinations

NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."



In making a negligible impact determination, NMFS considers a variety of factors, including but not limited to: (1) the number of anticipated mortalities; (2) the number and nature of anticipated injuries; (3) the number, nature, and intensity, and duration of harassment; and (4) the context in which the takes occur.

The takes from Level B harassment will be due to potential behavioral disturbance and TTS. The takes from Level A harassment will be due to potential tympanic-membrane (TM) rupture. Activities would only occur over a timeframe of two to three weeks in August 2013, with one or two missions occurring per day. It is possible that some individuals may be taken more than once if those individuals are located in the exercise area on two different days when exercises are occurring. However, multiple exposures are not anticipated to have effects beyond Level A and Level B harassment.

While animals may be impacted in the immediate vicinity of the activity, because of the small ZOIs (compared to the vast size of the GOM ecosystem where these species live) and the short duration of the Maritime Strike operations, NMFS has determined that there will not be a substantial impact on marine mammals. The activity is not expected to impact rates of recruitment or survival of marine mammals because neither mortality (which would remove individuals from the population) nor serious injury are anticipated to occur. In addition, the activity will not occur in areas (and/or times) of significance for the marine mammal populations potentially affected by the exercises (e.g., feeding or resting areas, reproductive areas), and the activities will only occur in a small part of their overall range, so the impact of any potential temporary displacement will be negligible and animals are expected to return to the area after the cessations of activities. Although the activity could result in Level A (TM rupture) and Level B

(behavioral disturbance and TTS) harassment of marine mammals, the level of harassment is not anticipated to impact rates of recruitment or survival of marine mammals because the number of exposed animals is expected to be low due to the short term and site specific nature of the activity, and the type of effect would not be detrimental to rates of recruitment and survival.

Additionally, the mitigation and monitoring measures to be implemented (described earlier in this document) are expected to further minimize the potential for harassment. The protected species surveys will require Eglin AFB to search the area for marine mammals, and if any are found in the live fire area, then the exercise will be suspended until the animal(s) has left the area or relocated. Moreover, marine species observers located in the Eglin control tower will monitor the high-definition video feed from cameras located on the instrument barge anchored on-site for the presence of protected species. Furthermore, Maritime Strike missions will be delayed or rescheduled if the sea state is greater than a 4 on the Beaufort Scale at the time of the test. In addition, Maritime Strike missions will occur no earlier than two hours after sunrise and no later than two hours prior to sunset to ensure adequate daylight for pre- and post-mission monitoring.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, NMFS finds that Eglin AFB's Maritime Strike operations will result in the incidental take of marine mammals, by Level A and Level B harassment, and that the taking from the Maritime Strike exercises will have a negligible impact on the affected species or stocks.

Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses

There are no relevant subsistence uses of marine mammals implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

#### Endangered Species Act (ESA)

Eglin AFB initiated consultation with the Southeast Region, NMFS, under section 7 of the ESA regarding the effects of this action on ESA-listed species and critical habitat under the jurisdiction of NMFS. The consultation was completed and a biological opinion issued on May 6, 2013. The biological opinion analyzed the effects of the exercise on five species of sea turtles, Gulf sturgeon, smalltooth sawfish, sperm whales, and Gulf sturgeon critical habitat. The biological opinion concluded that the action, as proposed, may adversely affect four species of sea turtles (loggerhead, Kemp's ridley, green, and leatherback). In addition, the project may affect, but is not likely to adversely affect, hawksbill sea turtles, smalltooth sawfish, Gulf sturgeon, sperm whales, and Gulf sturgeon critical habitat.

#### National Environmental Policy Act (NEPA)

Eglin AFB released a Draft Environmental Assessment (EA) on the Maritime Strike Operations. NMFS made this EA available on the permits webpage. On May 30, 2013, Eglin AFB issued a Final EA and a Finding of No Significant Impact (FONSI) on the Maritime Strike Operations.

In accordance with NOAA Administrative Order 216-6 (Environmental Review Procedures for Implementing the National Environmental Policy Act, May 20, 1999), NMFS reviewed the information contained in Eglin AFB's EA and determined the EA accurately and

completely described the preferred action alternative, a reasonable range of alternatives, and the potential impacts on marine mammals, endangered species, and other marine life that could be impacted by the preferred and non-preferred alternatives. Based on this review and analysis, NMFS adopted Eglin AFB's PEA under 40 CFR 1506.3, and issued its own FONSI statement on issuance of an annual authorization under section 101(a)(5) of the MMPA.

#### Proposed Authorization

As a result of these determinations, NMFS authorizes the take of two species of marine mammals incidental to Eglin AFB's Maritime Strike operations in the GOM provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: August 13, 2013.

---

Donna S. Wieting,  
Director,  
Office of Protected Resources,  
National Marine Fisheries Service.

[FR Doc. 2013-20521 Filed 08/21/2013 at 8:45 am; Publication Date: 08/22/2013]